

What is claimed is:

1. An organic acid salt of gabapentin, wherein the organic acid is tartaric acid, ethanedisulfonic acid, or maleic acid.
2. The organic acid salt according to claim 1, wherein the organic acid is tartaric acid and the mole ratio of gabapentin to tartaric acid is approximately 1:1.
3. The organic acid salt according to claim 1, wherein the organic acid is ethanedisulfonic acid and the mole ratio of gabapentin to ethanedisulfonic acid is approximately 2:1.
4. The organic acid salt according to claim 1, wherein the salt is crystalline.
5. A pharmaceutical composition comprising a tartaric acid, ethanedisulfonic acid, or maleic acid salt of gabapentin.
6. The pharmaceutical composition according to claim 5, which further comprises a pharmaceutically acceptable carrier, diluent, or excipient.
7. The organic acid salt according to claim 1, wherein
 - (a) the salt is characterized by a powder X-ray diffraction pattern comprising peaks expressed in terms of 2-theta angles, wherein:
 - (i) said salt is a DL-tartaric acid salt and said X-ray diffraction pattern comprises peaks at 5.1, 13.67, and 16.91 degrees;
 - (ii) said salt is a DL-tartaric acid salt and said X-ray diffraction pattern comprises peaks at 18.57, 19.55, and 21.57 degrees;
 - (iii) said salt is a DL-tartaric acid salt and said X-ray diffraction pattern comprises peaks at 5.1, 9.95, and 18.57 degrees;
 - (iv) said salt is a DL-tartaric acid salt and said X-ray diffraction pattern comprises peaks at 5.1 and 13.67 degrees;
 - (v) said salt is a DL-tartaric acid salt and said X-ray diffraction pattern comprises peaks at 18.57 and 19.55 degrees;

- (vi) said salt is a DL-tartaric acid salt and said X-ray diffraction pattern comprises peaks at 5.1 and 16.91 degrees;
- (vii) said salt is a DL-tartaric acid salt and said X-ray diffraction pattern comprises a peak at 5.1 degrees;
- (viii) said salt is a DL-tartaric acid salt and said X-ray diffraction pattern comprises a peak at 13.67 degrees; or
- (ix) said salt is a DL-tartaric acid salt and said X-ray diffraction pattern comprises a peak at 18.57 degrees;
- (b) the salt is characterized by a DSC thermogram, wherein said salt is a DL-tartaric acid salt and said DSC thermogram comprises an endothermic transition at about 148 degrees C;
- (c) the salt is characterized by a TGA thermogram, wherein said salt is a DL-tartaric acid salt and said TGA thermogram comprises a weight loss of about 11.5 percent between room temperature and about 175 degrees C; or
- (d) the salt is a DL-tartaric acid salt and exhibits a single crystal X-ray crystallographic analysis with crystal parameters that are approximately equal to the following:

Unit cell parameters	
a (Å)	17.695(2)
b (Å)	6.6547(8)
c (Å)	13.3782(16)
α (°)	90
β (°)	107.317(2)
γ (°)	90
V (Å ³)	1503.9(3)
Z	4
Crystal system	Monoclinic
Space group	P2(1)/c
Density (Mg/m ³)	1.419
R1	0.0706
wR2	0.1553

8. The organic acid salt according to claim 1, wherein

- (a) the salt is characterized by a powder X-ray diffraction pattern comprising peaks expressed in terms of 2-theta angles, wherein:

- (i) said salt is an ethanedisulfonic acid salt and said X-ray diffraction pattern comprises peaks at 6.17, 11.49, and 15.05 degrees;
- (ii) said salt is an ethanedisulfonic acid salt and said X-ray diffraction pattern comprises peaks at 17.35, 20.21, and 24.65 degrees;
- (iii) said salt is an ethanedisulfonic acid salt and said X-ray diffraction pattern comprises peaks at 6.17, 17.35, and 20.21 degrees;
- (iv) said salt is an ethanedisulfonic acid salt and said X-ray diffraction pattern comprises peaks at 6.17 and 17.35 degrees;
- (v) said salt is an ethanedisulfonic acid salt and said X-ray diffraction pattern comprises peaks at 11.49 and 15.05 degrees;
- (vi) said salt is an ethanedisulfonic acid salt and said X-ray diffraction pattern comprises peaks at 20.21 and 24.65 degrees;
- (vii) said salt is an ethanedisulfonic acid salt and said X-ray diffraction pattern comprises a peak at 6.17 degrees;
- (viii) said salt is an ethanedisulfonic acid salt and said X-ray diffraction pattern comprises a peak at 17.35 degrees; or
- (ix) said salt is an ethanedisulfonic acid salt and said X-ray diffraction pattern comprises a peak at 11.49 degrees;

- (b) the salt is characterized by a DSC thermogram, wherein said salt is an ethanedisulfonic acid salt and said DSC thermogram comprises an endothermic transition at about 184 degrees C;
- (c) the salt is characterized by a TGA thermogram, wherein said salt is an ethanedisulfonic acid salt and said TGA thermogram comprises a weight loss of about 38 percent between about 100 degrees C and about 263 degrees C; or
- (d) the salt is an ethanedisulfonic acid salt and exhibits a single crystal X-ray crystallographic analysis with crystal parameters that are approximately equal to the following:

Unit cell parameters	
a (Å)	5.5971 (7)
b (Å)	8.0151 (10)

c (Å)	14.6776 (18)
α (°)	78.971 (2)
β (°)	88.025 (2)
γ (°)	75.867 (2)
V (Å ³)	626.68 (13)
Z	2
Crystal system	Triclinic
Space group	P(-1)
Density (Mg/m ³)	1.411
R1	0.0632
wR2	0.1446

9. The organic acid salt according to claim 1, wherein

- (a) the salt is characterized by a powder X-ray diffraction pattern comprising peaks expressed in terms of 2-theta angles, wherein:
 - (i) said salt is a maleic acid salt and said X-ray diffraction pattern comprises peaks at 4.6, 14.99, and 16.93 degrees;
 - (ii) said salt is a maleic acid salt and said X-ray diffraction pattern comprises peaks at 6.7, 7.8, and 20.47 degrees;
 - (iii) said salt is a maleic acid salt and said X-ray diffraction pattern comprises peaks at 14.99, 20.47, and 28.03 degrees;
 - (iv) said salt is a maleic acid salt and said X-ray diffraction pattern comprises peaks at 4.6 and 14.99 degrees;
 - (v) said salt is a maleic acid salt and said X-ray diffraction pattern comprises peaks at 6.7 and 7.8 degrees;
 - (vi) said salt is a maleic acid salt and said X-ray diffraction pattern comprises peaks at 4.6 and 14.99 degrees;
 - (vii) said salt is a maleic acid salt and said X-ray diffraction pattern comprises a peak at 4.6 degrees;
 - (viii) said salt is a maleic acid salt and said X-ray diffraction pattern comprises a peak at 14.99 degrees; or
 - (ix) said salt is a maleic acid salt and said X-ray diffraction pattern comprises a peak at 16.93 degrees; or
- (b) the salt is characterized by a DSC thermogram, wherein said salt is a maleic acid salt and said DSC thermogram comprises:
 - (i) an endothermic transition at about 71 degrees C; or

(ii) an endothermic transition at about 102 degrees C.

10. A co-crystal comprising gabapentin and urea.

11. The co-crystal of claim 10, wherein

- (a) the co-crystal is characterized by a powder X-ray diffraction pattern comprising peaks expressed in terms of 2-theta angles, wherein:
 - (i) said co-crystal is a gabapentin:urea co-crystal and said X-ray diffraction pattern comprises peaks at 7.87, 16.97, and 22.25 degrees;
 - (ii) said co-crystal is a gabapentin:urea co-crystal and said X-ray diffraction pattern comprises peaks at 16.97, 24.61, and 29.33 degrees;
 - (iii) said co-crystal is a gabapentin:urea co-crystal and said X-ray diffraction pattern comprises peaks at 7.87, 24.61, and 29.33 degrees;
 - (iv) said co-crystal is a gabapentin:urea co-crystal and said X-ray diffraction pattern comprises peaks at 7.87 and 16.97 degrees;
 - (v) said co-crystal is a gabapentin:urea co-crystal and said X-ray diffraction pattern comprises peaks at 16.97 and 22.25 degrees;
 - (vi) said co-crystal is a gabapentin:urea co-crystal and said X-ray diffraction pattern comprises peaks at 7.87 and 22.25 degrees;
 - (vii) said co-crystal is a gabapentin:urea co-crystal and said X-ray diffraction pattern comprises a peak at 7.87 degrees;
 - (viii) said co-crystal is a gabapentin:urea co-crystal and said X-ray diffraction pattern comprises a peak at 16.97 degrees; or
 - (ix) said co-crystal is a gabapentin:urea co-crystal and said X-ray diffraction pattern comprises a peak at 22.25 degrees;
- (b) the co-crystal is characterized by a DSC thermogram, wherein said DSC thermogram comprises an endothermic transition at about 171 degrees C; or
- (c) the co-crystal is characterized by a TGA thermogram, wherein said TGA thermogram comprises a weight loss of about 7.8 percent between about room temperature and about 88 degrees C.

12. A process for the preparation of a tartaric acid, ethanedisulfonic acid, or maleic acid salt of gabapentin, which comprises:

- (1) mixing gabapentin with an organic acid to form a mixture;
- (2) subjecting the mixture to conditions which salify the gabapentin whereby crystals of a gabapentin salt are formed; and
- (3) optionally isolating the salt, wherein the organic acid is tartaric acid, ethanedisulfonic acid, or maleic acid.

13. The process according to claim 12, wherein the gabapentin is mixed with the organic acid in solution.

14. The process according to claim 13, wherein the mixture is subjected in step (2) to conditions to evaporate solvent.

15. The process according to claim 14, wherein step (2) further comprises heating and cooling the solution.

16. The process according to claim 12, wherein the gabapentin is mixed with the organic acid in a solid phase.

17. The process according to claim 16, wherein the mixture is a solid mixture which is subjected in step (2) to heating to salify the gabapentin.

18. The process according to claim 17, wherein the mixture is ground prior to heating.

19. A process for modulating the solubility of gabapentin for use in a pharmaceutical composition, which process comprises:

- (1) mixing gabapentin with an organic acid to form a mixture; and
- (2) salifying the gabapentin with the organic acid so that the solubility of the gabapentin is modulated, wherein the organic acid is tartaric acid, ethanedisulfonic acid, or maleic acid.

20. A process for modulating the dose response of gabapentin for use in a pharmaceutical composition, which process comprises:

- (1) mixing gabapentin with an organic acid to form a mixture, and
- (2) salifying the gabapentin with the organic acid so that the dose response of the gabapentin is modulated, wherein the organic acid is tartaric acid, ethanesulfonic acid, or maleic acid.

21. A method for treating a subject with a brain disorder, which comprises administering to the subject a therapeutically effective amount of a tartaric acid, ethanesulfonic acid, or maleic acid salt of gabapentin.